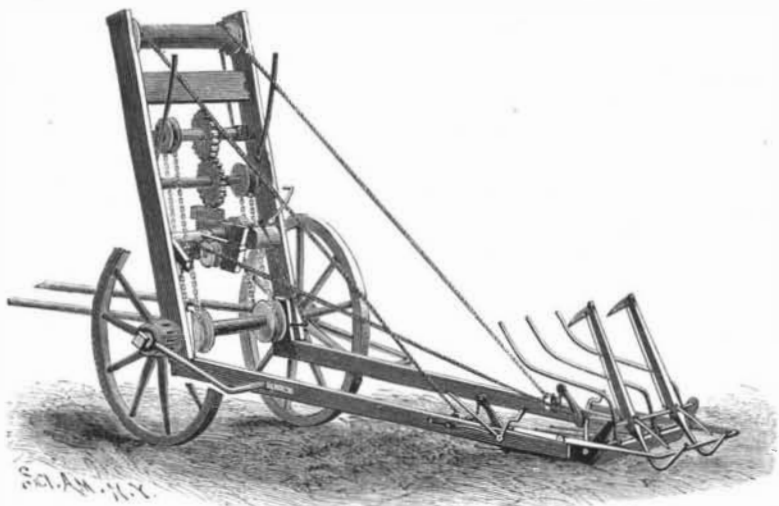


A HAY LOADER FOR FIELD WORK.

This loader, when drawn over the cocks of hay, is designed to gather up the desired quantities and automatically raise the rake to deliver the hay into a wagon to which the loader may be attached, a trip mechanism opening the rake for the delivery of its contents, and the rake being then automatically lowered to receive another load. The improvement has been patented by Mr. Fletcher M. Bird, of Wenatchee, Washington. The body frame of the loader consists of two uprights pivotally attached to the axle, to

**BIRD'S HAY LOADER.**

which is likewise pivoted a loading frame consisting of two parallel side bars. On the body frame is a drum shaft carrying two cables which extend upward over a friction roller, and are secured to the side bars of the loading frame. On the drum shaft is a gear meshing with a gear on a shaft below it, which carries near one end a pulley, connected by a belt or chain with a pulley on the axle, while another pulley on the axle is also connected by a belt or chain with a pulley on the drum shaft, both of these belts being so loose that they will be inoperative in the absence of a tightener. A cam shaft, carrying a block-like cam and weighted arms and tightener pulleys, acts as such tightener to control the movement of the drum shaft, whereby it is revolved in one direction or the other to elevate the loading frame and return it to loading position after the load has been dropped. The rake frame, pivoted in the loading frame, has lower stationary teeth, and in the back of the frame is journaled a shaft carrying movable teeth, a crank arm connected with a shifting lever being attached to the shaft. As the rake receives its load, the movable teeth are pressed upward until the complement of hay has been received, when the shifting lever is disconnected from its keeper, and the drum shaft elevates the loading frame and the rake, a trip yoke engaging lock levers, whereby fingers enter the hay to keep it from slipping. When the point of delivery is reached, the lock levers release the yoke and the fingers are raised out of the hay to permit it to drop into the wagon, after which the loading frame is again automatically lowered to the ground.

NEW BRITISH WAR BOATS OF GREAT POWER AND SPEED.

The British government is making renewed efforts to increase its naval forces and maintain its long-

boasted supremacy on the seas. New war ships are being built, and especial attention is being given to the increase of the number of comparatively small but very powerful and swift torpedo boats—torpedo catchers they are called. Among the latest examples of new vessels in this line is the Havock, of which we here give, from the *Graphic*, London, an illustration.

The Havock was lately completed by Messrs. Yarrow for Her Majesty's navy, and on a recent trial yielded remarkable speed results. On the three hours' run in rough weather—the wind blowing 30 miles per hour—a speed of over 26 knots was reached. On the measured mile the mean of four runs was 26.78 knots. The fastest mile run was at the rate of 27.565 knots, and the mean of the best two runs was over 27 knots. This is believed to be the fastest craft afloat. The indicated horse power was 3,400, and the engine revolutions 362 per minute.

The boats have twin screws, and generally resemble the first class torpedo boats built by this firm. The length is 180 feet and the width 18 feet 6 inches. There is the usual hood or turtle-back forward, although some modifications have been introduced with a view to getting a drier deck when the vessel is steaming into a head sea. The propellers are three-bladed. The engines are of the usual tri-compound type adopted by the firm, having cylinders 18 inches, 26 inches,

and 39½ inches in diameter by 18 inches stroke. The boilers, two in number, as stated, are of the locomotive type, and have copper fireboxes with copper tubes. The total grate surface is about 100 square feet and the total heating surface about 5,000 square feet. The deadweight load on board was 35 tons.

A further trial was subsequently had for eight hours at an economical speed, with a view to ascertain the distance the Havock would steam with the fuel supply she can carry on board, upon which depends her radius of action. It was found that at a speed of 11.2 knots the consumption was under a quarter of a ton an hour, and at 10 knots 3½ hundred weight an hour; and as the bunkers have a capacity of 60 tons, it follows that the distance the Havoc can steam without coaling is about 3,500 knots.

These vessels, with their high speed and considerable armament, would be likely to play an important part in a naval engagement.

Thirty-six of these boats have already been ordered, and six more, it is thought, will soon be ordered. The cost is about \$200,000 each.

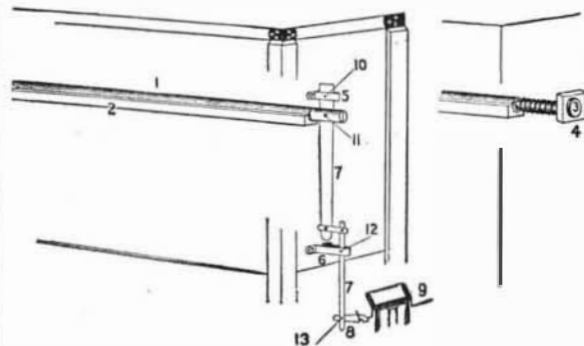
It is to be hoped Congress will not be backward in providing for the construction of a sufficient number of similar vessels to assist in the defense of our harbors.

THE IMPROVED "MONITOR" INCUBATOR.

An incubator which has stood the test of many years' experience, and proved highly successful in a practical and economical way for the artificial hatching of chicks and ducklings, is shown in the accompanying illustrations. It is manufactured by A. F. Williams, 61 Race Street, Bristol, Conn., and was awarded two medals and two diplomas at the World's Columbian Exposition. The case has double top, bottom, side and back, affording a dead air space all around, and it has two doors, the inside one being of

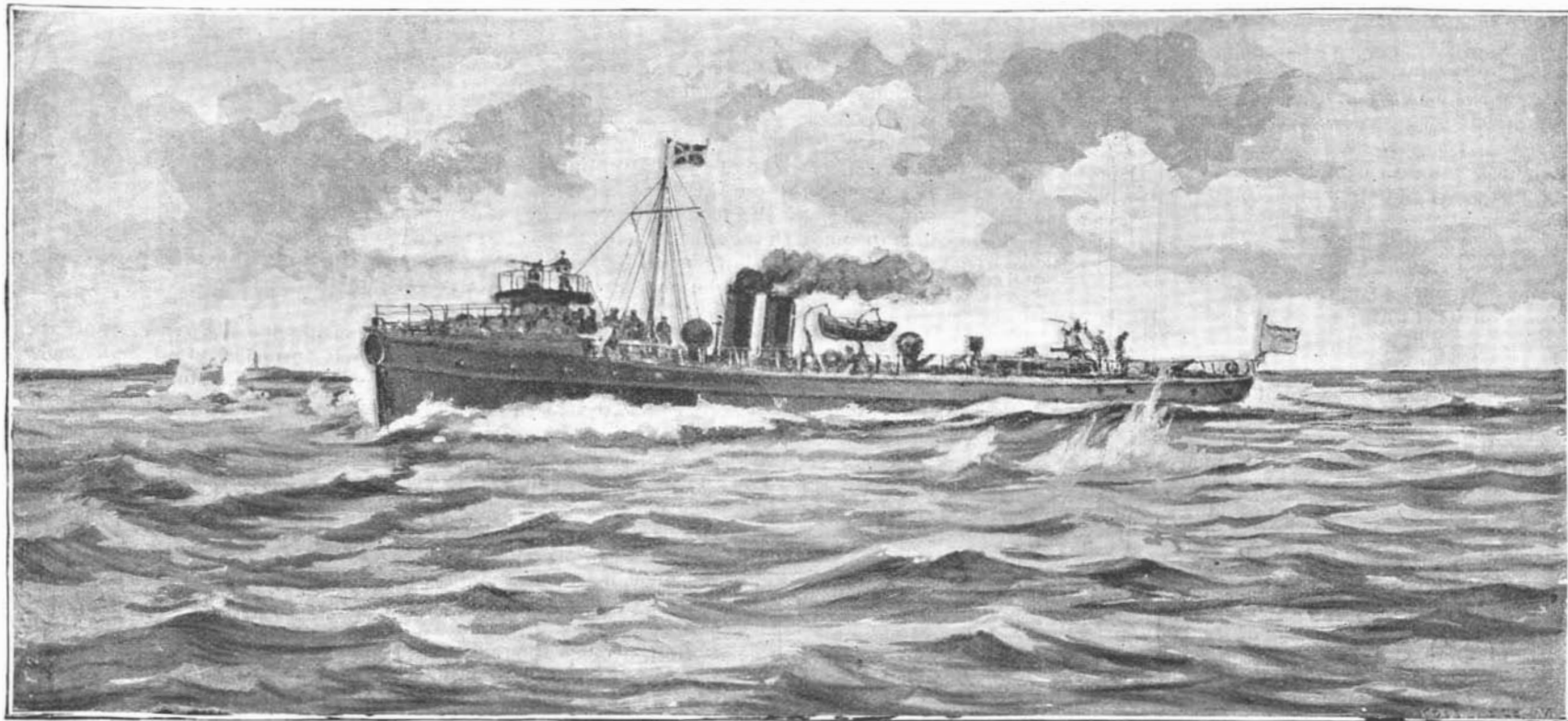
glass, the whole being so put together as to prevent warping and shrinking, to last a long time without getting out of repair, and preserve an absolutely uniform temperature in the egg chamber.

The heat is regulated by a rubber rod, 1, that lies over the eggs in a trough, 2, the end of the rod farthest from boiler having an adjusting thumb screw, 3, and a block, 4, and spring forcing the expansion on the other end of the rod. On the other end is a double lever, 7, pinned to a frame, 5, through which the end of the thermostat is pinned. On the bottom or lower lever is another frame which the lever is pinned through, all very evenly balanced, so that the slightest change of the thermostat will force the double levers to throw the bottom in or out. The brass connection, 8, pinned to bottom of lever, is connected to lamp burner, lever and damper, 9. This lever is so sensitive that even a hair will turn it, and the damper is set

**DIAGRAM SHOWING PARTS OF INCUBATOR.****A SIXTY-EGG INCUBATOR EXHIBITED AT THE FAIR.**

close to the cone of lamp burner, but so that smoking is impossible.

It is said that on a recent trial of a 150-egg incubator it was locked up in a room alone for forty-eight hours and the temperature varied only one-half of a degree in that time. The air entering the incubator is warmed before reaching the egg chamber, and there is no direct draught upon the eggs. The air chambers and the evaporating pans are so arranged that the amount of moisture in the air is always under perfect control, the degree of humidity being registered by a hygrometer. The eggs are quickly turned without taking out the egg drawer, and the whole operation of the incubator is extremely simple.

**THE NEW BRITISH TORPEDO BOAT HAVOCK—THE FASTEST WAR VESSEL AFLOAT.**